

WHAT IS CLAIMED IS:

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1. A digital camera comprising:  
an image sensor having a plurality of two-  
dimensionally arranged pixels capable of  
selectively reading out signals from desired pixels  
and capable of adding signals of at least two pixels  
prior to getting the output from the image sensor;  
a first processor for processing outputs got from  
the individuals of the pixels of the image sensor  
to form a picture image of an object of the camera;  
and  
a second processor for processing the added signal  
of the image sensor for light metering of the  
object.
  2. The digital camera according to claim 1, wherein the  
second processor processes the added signal obtained  
by adding signals of a less number of pixels than that  
of the pixels from which the outputs are got to be  
processed by the first processor.
  3. The digital camera according to claim 1, wherein  
electric charge is accumulated on the pixels of the  
image sensor to generate the outputs to be got, and  
wherein the second processor includes a timer for  
determining a time period from a start of the  
accumulation of charge to a time when the added signal  
reaches a predetermined level, the light metering  
being in accordance with the time period.
  4. A digital camera comprising:  
an image sensor having a plurality of two-  
dimensionally arranged pixels on which electric  
charge is accumulated to generate signals,  
respectively, capable of selectively reading out

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the signals from desired pixels; and  
a processor for light metering including a timer for  
determining a time period from a start of the  
accumulation of charge to a time when a signal from  
the image sensor reaches a predetermined level, the  
light metering being on the basis of the time  
period.

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5. The digital camera according to claim 4, wherein the  
image sensor is further capable of adding signals  
of at least two pixels prior to getting the outputs  
from the image sensor, and wherein the timer  
determines a time period from a start of the  
accumulation of charge to a time when the added  
signal reaches a predetermined level.

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6. The digital camera according to claim 5, wherein the  
processor for light metering further comprises an  
output reader for repeating to get the outputs from  
the pixels in accordance with a predetermined  
timetable, and a comparator for comparing the  
signal with the predetermined level, and wherein  
the timer determines a time period from a start of  
the accumulation of charge to a time when the  
comparator informs that the added signal reaches  
the predetermined level.

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7. The digital camera according to claim 6, wherein the  
predetermined level corresponds to the optimum  
exposure level of the camera.

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8. The digital camera according to claim 6, wherein the  
output reader repeats to get the outputs from the  
pixels with the charge accumulation continued  
without being reset during the period in which the

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timer is determining the time.

- 5 9. The digital camera according to claim 6, wherein an interval between the repetition of getting the output by the output reader is changeable among pixels.
- 10 10. The digital camera according to claim 9, wherein the output reader gives priority to a pixel of the shorter interval in getting the output.
11. The digital camera according to claim 9, wherein the signals from pixels of the same interval are added prior to getting the outputs from the pixels.
- 15 12. The digital camera according to claim 6, wherein an interval between the repetition of getting the output by the output reader is variable for changing a range of light metering.
- 20 13. The digital camera according to claim 6, further comprising an aperture through which the image sensor receives light, wherein the aperture is variable for changing a range of light metering.
- 25 14. The digital camera according to claim 4, further comprising a focus detector for processing the signal of the image sensor to detect the focusing condition of the camera.
- 30 15. The digital camera according to claim 14, wherein the focus detector processes the outputs from the individuals of the pixels of the image sensor to form a digital image to be investigated in the focus detection.

16. The digital camera according to claim 14, wherein a range covering the pixels participating in the focus detection differs from that in the light metering.

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17. The digital camera according to claim 14, wherein the image sensor is reset after the time period relating to the light metering to accumulate charge for the same period as the time period to get signals for the focus detection.

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18. The digital camera according to claim 17, wherein the image sensor is reset after the focus detection to accumulate charge for the time period calculated from light metering calculation to get signals for forming a picture image of an object of the camera.

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19. The digital camera according to claim 14, wherein the image sensor is further capable of adding signals of at least two pixels prior to getting the outputs from the image sensor, and wherein the focus detector processing the added signals when the light metering informs an insufficient brightness of an object in terms of the focus detection.

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20. The digital camera according to claim 19, wherein the addition means the simple addition of signals from more than two pixels adjacent with each other.

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21. The digital camera according to claim 19, wherein the addition means the moving addition of signals from more than two pixels adjacent with each in which the pixel is shifted by one on every addition.

22. The digital camera according to claim 14, further

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comprising a white balance calculator for processing the signal obtainable from the image sensor without resetting the image sensor after the focus detection.

5 23. The digital camera according to claim 22, wherein the image sensor is further capable of adding signals of at least two pixels prior to getting the outputs from the image sensor, and wherein the white balance calculator processes the added signal.

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24. The digital camera according to claim 14, further comprising picture image processor for processing the signals from the image sensor to form a picture image of an object of the camera and a white balance  
15 calculator for processing the signal obtainable from the image sensor without resetting the charge accumulated on the image sensor for the picture image.

20 25. The digital camera according to claim 14, further comprising a memory for storing the signals from the image sensor to form a picture image of an object of the camera and a white balance calculator for processing the signals stored in the memory.

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26. A digital camera according to claim 4, wherein after accumulation of charge for light metering, the calculation for white balance is performed, and the output of the pixels is got from the image sensor for  
30 focus detection.

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27. The digital camera according to claim 14, wherein the focus detector includes an optical system for forming an image of an object on the image sensor, a pair of apertures for dividing light flux of the  
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optical system and filters each arranged across the divided light fluxes passing through the pair of apertures, respectively.

- 5 28. The digital camera according to claim 27, wherein the image sensor is of a color image sensor having red, green and blue pixels and wherein the filters arranged across the divided light fluxes are of green and magenta filters, respectively.

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29. The digital camera according to claim 22, wherein the image sensor receives light through the pair of apertures on light metering.

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30. The digital camera according to claim 29, further comprising another aperture through which the image sensor receives light, wherein the pair of apertures are replaced by the another aperture for changing a range of light metering.

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31. A focusing detector comprising:  
a color image sensor having red, green and blue pixels;  
an optical system for forming an image of an object  
25 on the color image sensor;  
a pair of apertures for dividing light flux of the optical system; and  
green and magenta filters each arranged across the divided light fluxes passing through the pair of  
30 apertures, respectively.

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32. The focusing detector according to claim 31, wherein the pair of apertures are movable perpendicularly to the optical axis of the optical system.

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33. The focusing detector according to claim 31, wherein the pair of apertures are arranged symmetrically with the optical axis of the optical system.
- 5 34. The focusing detector according to claim 31, further comprising a shield arranged across the light flux of the optical axis, wherein the pair of apertures is defined by the shield.
- 10 35. The focusing detector according to claim 31, wherein both the light flux passing through the apertures are sensed simultaneously by the image sensor.
- 15 36. The focusing detector according to claim 31, further comprising another pair of apertures for dividing light flux of the optical system and green and magenta filters each arranged across the divided light fluxes passing through the second mentioned pair of apertures, respectively, the direction of alignment of the first mentioned pair of apertures being different from that of the second mentioned pair of apertures.
- 20 37. The focusing detector according to claim 31, further comprising an image processor for forming a first image on the basis of the green pixels of the color image sensor and a second image on the basis of the red and blue pixels of the color image sensor, and a calculator for calculating the degree and direction of defocus of the optical system with respect to the object on the basis of the cross correlation between the first and second images.
- 25 38. The focusing detector according to claim 37, wherein the calculator is responsive to information
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relating to the arrangement of the red, green and blue pixels in the image sensor to compensate the result of the calculation.

5 39. A digital camera comprising:

an image sensor having a plurality of two-dimensionally arranged pixels capable of selectively reading out signals from desired pixels and capable of adding signals of at least two-dimensionally arranged three pixels prior to getting the outputs from the image sensor;  
10 a processor for processing outputs got from the individuals of the pixels of the image sensor to form a picture image of an object of the camera;  
15 and  
a white balance calculator for processing the added signals of the image sensor.

20 40. The digital camera according to claim 39, wherein the image sensor has a plurality of kinds of color pixels, and wherein the white balance calculator processes the added signals in which the signals of the same kind of pixels are added, respectively.

25 41. The digital camera according to claim 40, the added signals are formed by adding signals of all the same kind of pixels, respectively.

30 42. A digital camera comprising:  
an image sensor having a plurality of two-dimensionally arranged pixels capable of selectively reading out signals from desired pixels;  
a processor for processing outputs got from the pixels of the image sensor to form a picture image  
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of an object of the camera; and  
a white balance calculator which functions after the  
process of the processor.

5 43. The digital camera according to claim 42, wherein  
the processor includes a memory for storing the  
signals from the image sensor to keep the picture  
image, wherein the white balance calculator  
processes the signals stored in the memory.

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44. The digital camera according to claim 42, wherein  
the white balance calculator processes signals read  
out from the pixels of the image sensor without  
resetting the signals of the image sensor which have  
15 been read out for the process of the processor.

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45. A digital camera comprising:

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an image sensor having a plurality of two-  
dimensionally arranged pixels capable of  
selectively reading out signals from desired pixels  
for the purpose of at least two of the processes  
for light metering, focus detection, white balance  
calculation and picture image forming; and

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an output reader for getting the outputs from the  
pixels for the purpose of at least two processes  
with the signals of the pixels kept without being  
reset between the first and second processes.

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46. A digital camera comprising:

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an image sensor having a plurality of two-  
dimensionally arranged pixels capable of  
selectively reading out signals from desired pixels  
for the purpose of at least two of the processes  
for light metering, focus detection, white balance  
calculation and picture image forming; the image

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sensor having a plurality of amplifiers of variable gain for amplifying the signals of the pixels, respectively; and

5 a gain controller for changing the gain between at least the two processes.

47. A digital camera comprising:

10 an image sensor having a plurality of two-dimensionally arranged pixels capable of selectively reading out signals from desired pixels for the purpose of at least two of the processes for light metering, focus detection, white balance calculation and picture image forming;

15 an amplifier of variable gain for amplifying the output of the image sensor;

a gain controller for changing the gain between at least the two processes.

48. A digital camera comprising:

20 an image sensor having a plurality of two-dimensionally arranged pixels capable of selectively reading out signals from desired pixels for the purpose of at least two of the processes for light metering, focus detection, white balance calculation and picture image forming, and wherein  
25 one process is started in response to completion of outputting the signals for another process.

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